Measuring Your Research Impact

Danica Lewis, Collections & Research Librarian for Life Sciences
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Learning Outcomes

At the end of this session, attendees will be able to:

- Understand what “broader impacts” and “research impact metrics” are
- Explain the how research impact metrics can be used to demonstrate broader impacts
- Articulate some of the differences between traditional impact metrics and altmetrics
- Identify tools that can be used to collate different impact metrics

Road Map

- Introduction to Research Impact Metrics
- Traditional Metrics
- Introduction to Broader Impacts
- Alternative Metrics
- Setting up Your Ecosystem

“TRADITIONAL” RESEARCH IMPACT METRICS

The What of Research Impact Metrics

Attempts to measure:

- How your work influences, shapes, and/or benefits others in the research community

Does NOT measure:

- The total value of your work to the research community
- Your contributions to broader society
- The potential long-tail life of your work (your future productivity)

The Why of Research Impact Metrics

- One method of demonstrating productivity
- Reveal trends of how your work is being used by others
- Quantify return on research investment for grant renewals and progress reports
- Compare your metrics with peers and/or leaders in your field
- Strengthen your application for promotion or tenure

Types of Traditional Research Impact Metrics

- Researcher Metrics
  - Depict the impact of a given researcher’s work

- Journal Metrics
  - Depict the impact of the works published within a given journal

- Item Level Metrics
  - Depict the impact of a single work

RESEARCHER METRICS

Researcher Metrics

h-index

i10 index

h-index - Overview

- A method of measuring the quality and quantity of an author’s work
- Developed in 2005 by Jorge Hirsch, a physicist at UC San Diego

Calculation: the number of papers published that have received at least the same number of citations. A researcher's h-index can be calculated manually by locating citation counts for all published papers and ranking them numerically by the times cited.

h-index - A closer look

Articles	Citation #'s
1	41
2	33
3	28
4	20
5	17
6	13
7	11
8	8 h-index = 8
9	6
10	4

*An **h-index of 8** means that this author has **published at least 8** papers that have **each received at least 8 citations**.*

The final two papers have **no effect** in this case, since they have been **cited less than 8 times**.

h-index

Strengths

- Includes more than a single data point (e.g. quality and quantity)
- Easy to calculate and understand
- Several resources, such as Web of Science, automatically calculate the h-index as a part of citation reports for authors

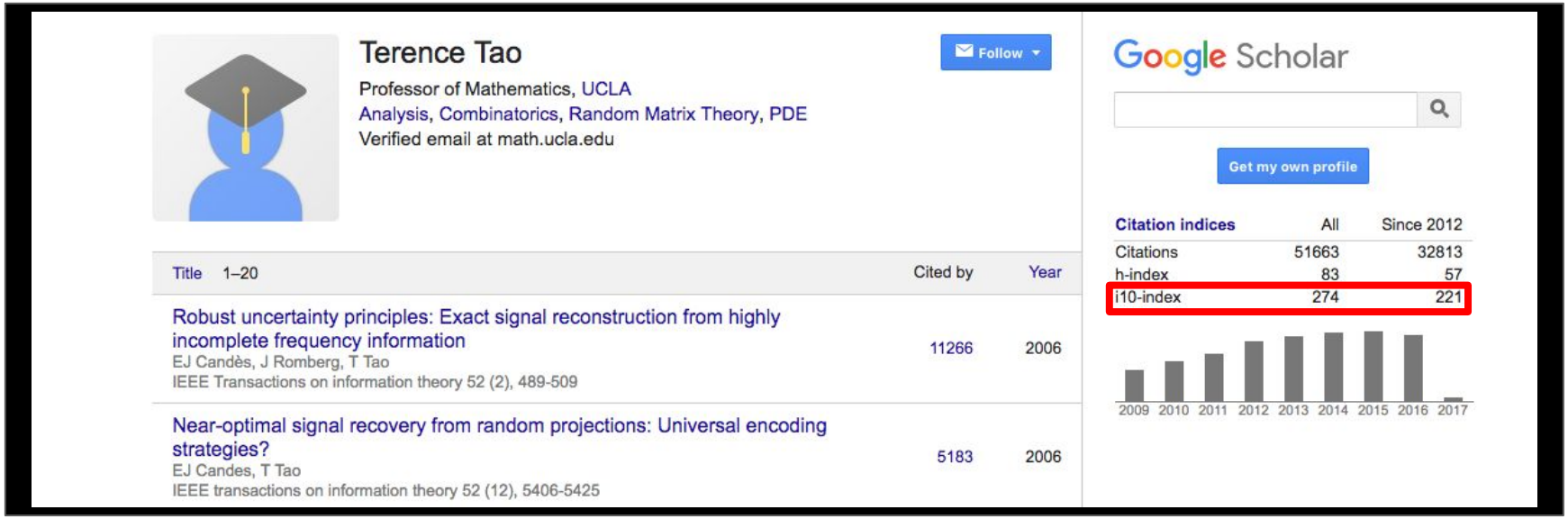
Limitations

- Inaccurate measure of early career researcher impact
- Only measures published works
- If a specific resource is used, such as Web of Science or Scopus, results are limited to what the tool has indexed

i10 index

- A method of measuring the quality of an author’s work
- Created by Google Scholar and used in Google's My Citations feature

Calculation: Counts the number of publications with at least 10 citations



i10 index

Strengths

- Easy to calculate and understand
- Google Scholar’s My Citation feature is free and easy to use

Limitations

- Used only in Google Scholar
- Limited to works indexed by Google Scholar
- Only measures published works

Common Tools

Name	Cost
Google Scholar	Free
Web of Science	$ (licensed by NCSU Libraries)
Scopus	$ (not licensed by NCSU Libraries)
CitedIn	Free
Publish or Perish	Free
Scholarometer	Free
CiteSeerX	Free

Scholar indices of well-known scientists

Scientist	**h-index** (using Publish or Perish)	**h-index** (using Scopus)
Newman, MEJ	65	51
Einstein, Albert	92	N/A (nothing submitted after 1995
Shannon, CE	44	N/A (nothing submitted after 1995
Erdős, Paul	76	8
Shenker, Scott	105	36
Hirsch, Jorge E	31	21
Pople, John	87	29

https://en.wikipedia.org/wiki/Scholar_Indices_and_Impact

JOURNAL METRICS

Traditional Journal Metrics

- Journal Impact Factor*
- Eigenfactor Score* & SCImago Journal Ranking (SJR)

*Thomson Reuters Metric

A Few Notes on Thomson Reuters Metrics*

- Substantial lag time before Thomson Reuters will index a journal
- New journals will not be listed in any of these metrics
- A journal may already have established a noteworthy impact in its field well before ISI indexes it
- Not being indexed in ISI does not necessarily suggest a lack of quality

Impact Factor

- Frequency with which the average article in a journal has been cited in a given time period
- Listed in Thomson Reuter's *Journal Citation Reports* (JCR)

Calculation:

$$\frac{\text{\# citations for articles published}}{\text{\# articles published}}$$

Impact Factor

Strengths

- The most widely known impact metric among researchers
- Easy to calculate, easy to understand

Limitations

- Is not normalized across disciplines
- Often underrepresents journals that publish higher numbers of papers

Internal Medicine

By Rank | Categories By Rank

les Ranked by Impact Factor — Show Visualization +

Selected Journals | Add Journals to New or Existing List | Customize Indicators

	Full Journal Title	Total Cites	Journal Impact Factor	Eigenfactor Score
1	NEW ENGLAND JOURNAL OF MEDICINE	283,525	59.558	0.68235
2	LANCET	195,553	44.002	0.40717
3	JAMA-JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION	129,909	37.684	0.27421
4	BMJ-British Medical Journal	93,118	19.697	0.16204
5	ANNALS OF INTERNAL MEDICINE	49,618	16.593	0.09583

Computational Physics

als By Rank | Categories By Rank

l Titles Ranked by Impact Factor — Show Visualization +

are Selected Journals | Add Journals to New or Existing List | Customize Indicators

	Full Journal Title	Total Cites	Journal Impact Factor	Eigenfactor Score
1	COMPUTER PHYSICS COMMUNICATIONS	14,445	3.635	0.03217
2	Communications in Nonlinear Science and Numerical Simulation	7,573	2.834	0.02208
3	JOURNAL OF COMPUTATIONAL PHYSICS	36,234	2.556	0.05439
4	Advances in Theoretical and Mathematical Physics	2,229	2.385	0.00316
5	COMMUNICATIONS IN MATHEMATICAL PHYSICS	16,857	2.375	0.03967

Immediacy Index

- The average number of times an article is cited in the year it is published
- Listed in Thomson Reuter's *Journal Citation Reports*

Calculation:

$$\frac{\text{\# citations to articles published in a given year}}{\text{\# articles published in that year}}$$

Immediacy Index

Strengths

- Indicates how quickly articles in a journal are cited
- Can provide useful insights when comparing journals that specialize in cutting-edge research

Limitations

- Is not normalized across disciplines
- Often underrepresents journals that publish higher numbers of papers
- Can overrepresent frequently or early issued journals

Eigenfactor Score / SCImago Journal Rank (SJR)

- Frequency with which the average article in a journal has been cited in a given time period
- Eigenfactor Score listed in eigenfactor.org and *Journal Citation Reports*. SJR listed in *CWTS Journal Indicator* or Scopus
- Calculation:
  - Based on number of articles cited in the past five years for a given journal
  - Unlike Impact Factor, it also takes into consideration where the citations are coming from and weights scores accordingly

Eigenfactor Score / SCImago Journal Rank (SJR)

Strengths

- Excludes references to the same journal title, which mitigates self-citation inflation
- Citations from more prominent journals are weighted
- Accounts for journal's size so it does not disadvantage prolific journals
- Can be used across disciplines

Limitations

- May underrepresent the impact of new, smaller journals

Cited Half-Life

- The median age of the articles that were cited in the JCR year
  - Half of a journal's cited articles were published more recently than the cited half-life
  - A journal with a low cited half-life suggests that knowledge in that area may turn over quickly
  - A journal with a higher cited half-life suggests that knowledge in that area may turn over slowly
- Listed in Thomson Reuter's *Journal Citation Reports*

Cited Half-Life

Strengths

- Can provide an indicator of the turnover rate for a given subject area's body of knowledge
- Can be useful when making decisions on collections or archiving

Limitations

- Only journals cited 100 or more times in the JCR year have a cited half-life
- Cited half-life does not necessarily provide an evaluation of a journal's value or impact

What about the item-level impact metrics?

- Traditional metrics are limited to things like Times Cited or Download Counts
- These metrics are problematic for many of the same reasons as Traditional Researcher Level and Journal Level metrics
  - Do not necessarily speak to the quality of individual work
  - May underrepresent the impact of recent works
  - Not comparable across disciplines
  - Can be “gamed”

Let’s dig into JCR!

lib.ncsu.edu

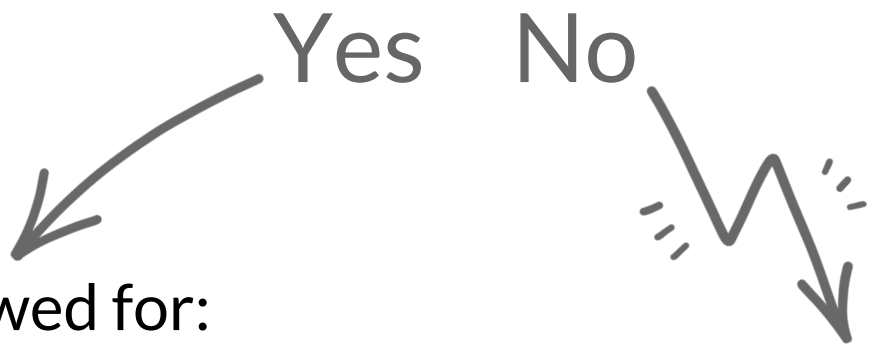
Take five minutes to explore the JCR on your own:

- Find the category that best matches your current area of research:
  - What are the top journal(s) by JIF?
  - Resort your results by Eignefactor - did the top journal change?
- Select an individual journal from the list:
  - Scroll down and look at “Rank” information for the journal
  - Has its rank changed drastically in the last 10 years? It’s quartile?
- Change the JCR year from 2016 to 2011
  - How much movement was there in the top 5 journals by JIF? Top ten?

BROADER IMPACTS

NSF Review Process

1. Did you follow the rules in the NSF Proposals and Award Policies and Procedures Guide, and the RFP?



Reviewed for:

1. Intellectual Merit
2. Broader Impacts

Automatically Returned without Review

Images by Ersin from the Noun Project

Review: Intellectual Merit

1. All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Proposal & Award Policies & Procedures Guide (PAPPG)

Broader Impacts

1. All NSF projects should be of the highest quality and have the potential to benefit society and advance societally desired outcomes.
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Proposal & Award Policies & Procedures Guide (PAPPG)

Broader Impacts

"...benefit society and advance societally desired outcomes."

Proposal & Award Policies & Procedures Guide (PAPPG) Chapter III.A.,
"...Broader impacts may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified."

Proposal & Award Policies & Procedures Guide (PAPPG)

Broader Impacts

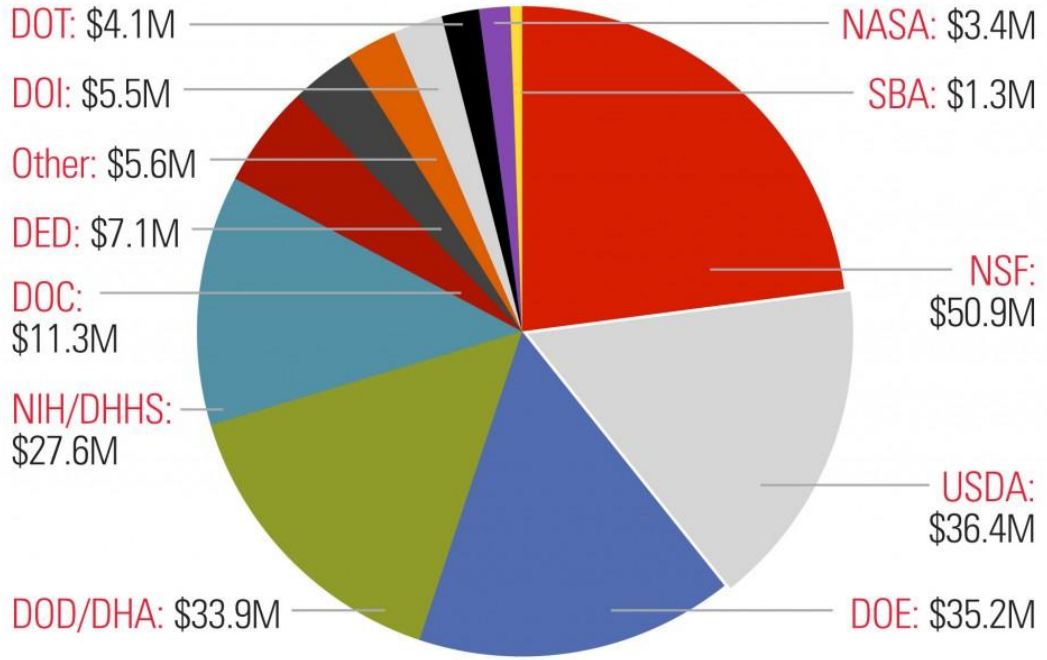
Desired Societal Outcomes NSF Grant Proposal Guide Chapter II.C.2.d.i 2014

- Full participation of women, persons with disabilities, and underrepresented minorities
- Improved STEM education and educator development at any level
- Increased public scientific literacy and public engagement with science and technology
- Improved well-being of individuals in society
- Development of a diverse, globally competitive STEM workforce
- Increased partnerships between academia, industry, and others
- Improved national security
- Increased economic competitiveness of the United States
- Enhanced infrastructure for research and education

Why Do We Care So Much About the NSF?

23% of our total awarded funding from federal agencies

NSF is our single largest source of federal funding



ORIED 2015 Annual Report

ALTERNATIVE RESEARCH IMPACT METRICS

What’s an “alternative metric”?

Different interactions:

- Viewed (clicks)
- Discussed (comments, shares)
- Saved (social bookmarking)
- Cited (traditional)
- Recommended (social media, scholarly systems)
- Policy Documents
- News articles

Different scholarship:

- Datasets
- Figures
- Posters
- Slide decks
- Software
- Videos
- Presentations
- Lesson Plans and OER

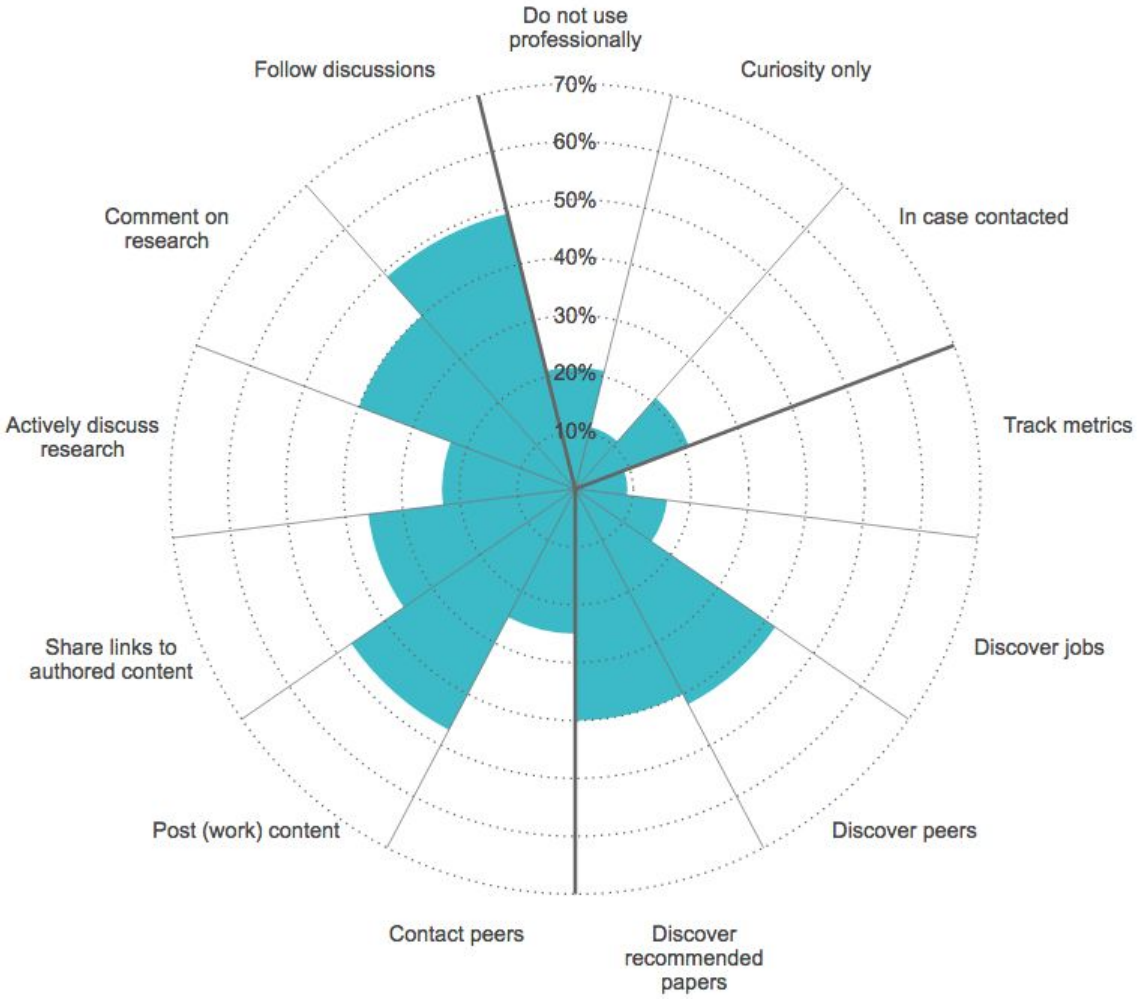
The Promise of Alternative Metrics:

- A way to track the impact of all your outputs, not just journal articles and monographs
- A quicker insights into the impact of your work than waiting on citations
- A broader look at how your work is impacting others

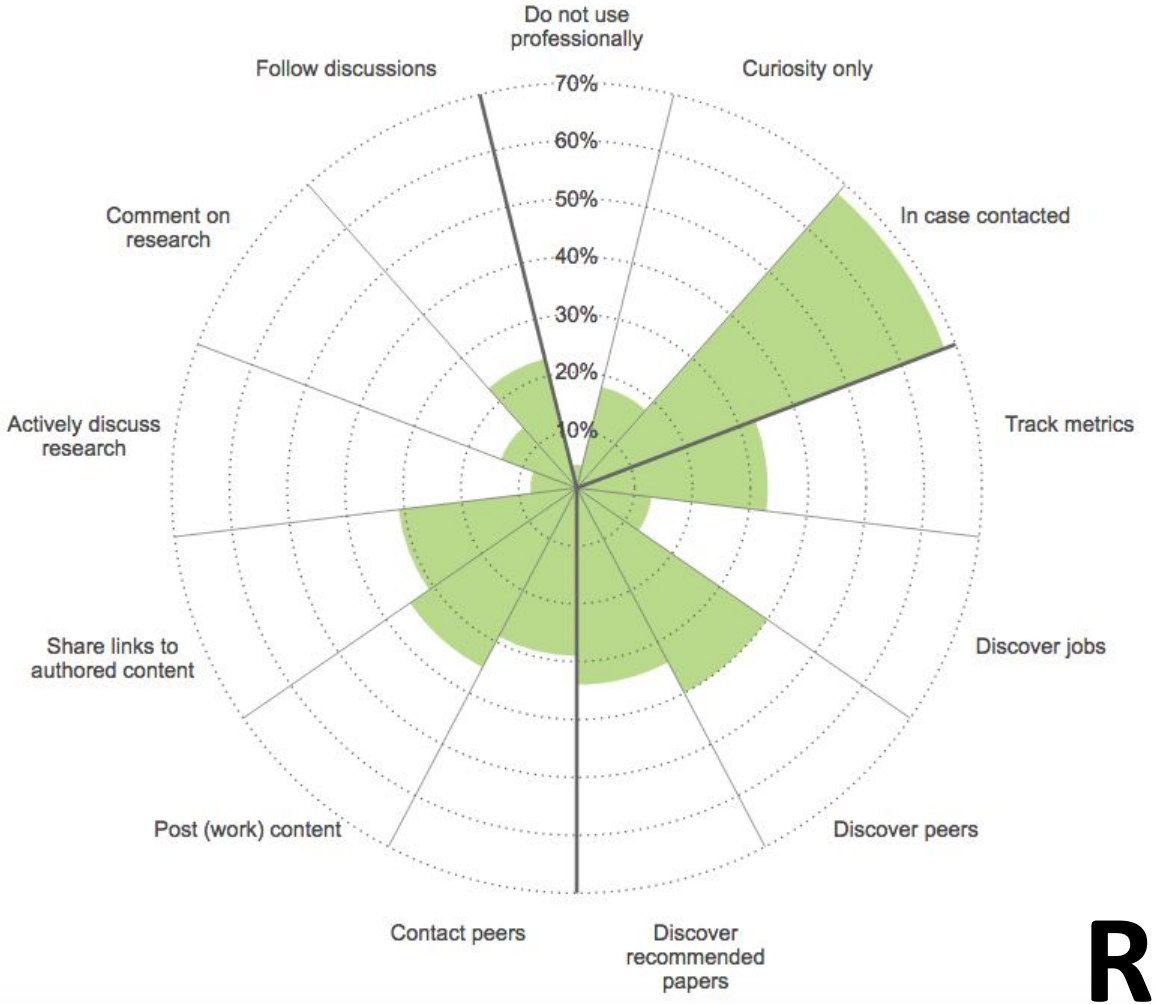
The Problem:

- All of these **interactions** happen in different places
  - e.g. ResearchGate, Twitter, YouTube, your personal website

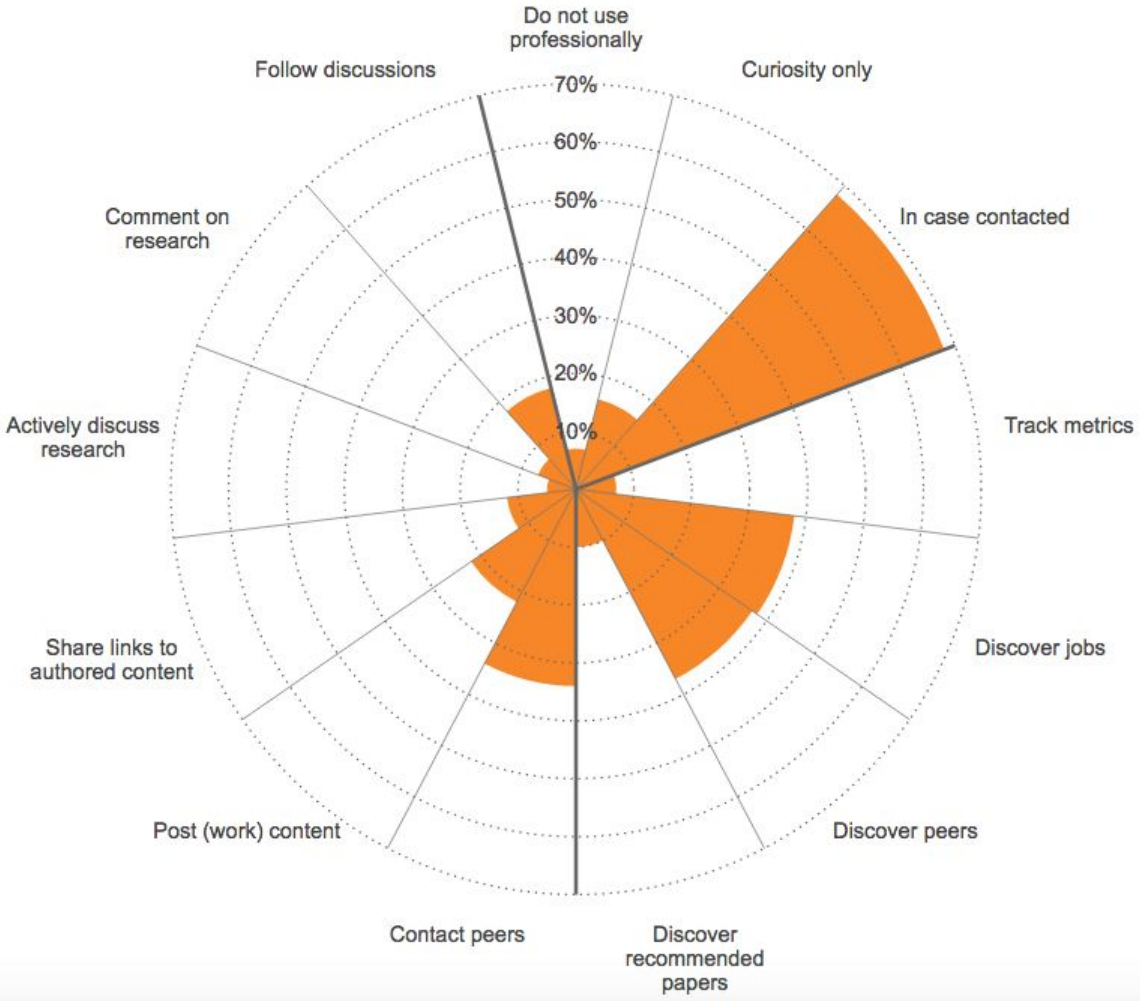
- All of these forms of **scholarship** are stored in different places
  - Journal websites, Twitter, repositories, your personal website


Do not use professionally
Curiosity only
In case contacted
Track metrics
Discover jobs
Discover peers
Discover recommended papers
Contact peers
Post (work) content
Share links to authored content
Actively discuss research
Comment on research
Follow discussions
70%
60%
50%
40%
30%
20%
10%

Twitter



ResearchGate


Do not use professionally
Curiosity only
In case contacted
Track metrics
Discover jobs
Discover peers
Discover recommended papers
Contact peers
Post (work) content
Share links to authored content
Actively discuss research
Comment on research
Follow discussions
70%
60%
50%
40%
30%
20%
10%

LinkedIn

One proposed solution: Alt-impact aggregators

Impactstory

Researcher focused metrics

- Integrates with ORCID and can automatically update your profile with new citations
- Integrates with Scoups to easily search and add new works
- Twitter integration
- Badging system to track achievements and engagement
- Supported by NSF and Alfred P. Sloan Foundation

Altmetric

Article / work focused metrics

- Tracks and collates online attention for a given work
- Creates “weighted” scores for the impact of works
  - Interactions are given more “weight” than press releases
  - Traditional media mentions given more weight than social media, etc
- The “Altmetric donut” graphically represents different categories of engagement

IMPACT STORY

https://profiles.impactstory.org/u/0000-0001-6728-7745

ALTMETRIC

https://www.nature.com/articles/543627a/metrics

Altmetric: Article-Level Metrics

The Colours of the Donut

- Policy documents
- News
- Blogs
- Twitter
- Post-publication peer-reviews
- Facebook
- Sina Weibo
- Wikipedia
- Google+
- LinkedIn
- Reddit
- Faculty1000
- Q&A (stack overflow)
- Youtube
- Pinterest

Altmetric
@altmetric

Following

Ever wondered where to find #altmetrics? Thousands of journals, institutional repository and all these platforms integrate @altmetric data:

RETWEETS 11 LIKES 14

5:15 AM - 31 Jan 2017

11 14

Benefits

- More inclusive of actual workflows
- Takes research out of the ivory tower, beneficial for early career
- Moving towards a more consolidated and interoperable system
- Diversity of data makes is harder to game
- Increasing adoption in terms of funding agencies

Pitfalls

- Gaming the system
  - Open API/OpenSource
- Commercial systems and black box accounting
- Lack of consistency between systems
- Slow early adoption in terms of tenure and promotion bodies

Researcher Identity Becomes a Digital Ecosystem

- Social Media Presence
  - Twitter, Academia.edu, ResearchGate
  - Discipline-specific social media platforms (e.g. Wikis or Forums)
- Publications
  - Informal Publishing (e.g. preprints & public communication)
  - Formal Publishing (e.g. refereed articles)
- Blogging & Personal Website
  - In process publication (e.g. lab notebooks, workflows)

IDENTITY MANAGEMENT

Researcher Identifiers

ORCID iD	First name	Last name
0000-0003-1337-4653	Maria	Papadopoulou
0000-0002-8468-3456	Maria	Papadopoulou
0000-0001-6451-8712	Maria	Papadopoulou
0000-0001-9252-4255	Maria	Papadopoulou
0000-0003-0985-9404	Maria	Papadopoulou
0000-0003-4914-8383	Maria	Papadopoulou
0000-0001-5167-7562	Maria	Papadopoulou

SUPPORTED WORK TYPES

ORCID allows for the addition of several types of works. Below is a list of the work types that are currently supported, for more information about the categories see CASRAI Output Standard.

PUBLICATIONS

Work Type	Use
book	Books written by a single author or collaboratively based on research or scholarly findings generally derived from peer reviewed funding.
book-chapter	Texts written by a single author or collaboratively based on research or scholarly findings and expertise in a field.
book-review	Critical review of works of fiction or non-fiction highlighting the contributions to an art, field or discipline.
dictionary-entry	Entries of new words, new meanings of existing words, changes in spelling and hyphenation over a longer period of time, and grammatical changes.
dissertation	Treatise advancing an original point of view resulting from research: a requirement for a doctoral degree.
encyclopedia-entry	Authored entries in a reference work or a compendium focusing on a particular domain or on all branches of knowledge.
edited-book	Books edited by a single author or collaboratively for the dissemination of research or scholarly findings that generally result from peer reviewed funding.
journal-article	Articles in peer-reviewed publications that disseminate the results of original research and scholarship.
journal-issue	Periodical publications aimed at fostering intellectual debate and inquiry.
magazine article	Articles in thematic publications published at fixed intervals.
manual	Course and assignment materials produced for teaching purposes.
online-resource	Information accessible only on the web via traditional technical methods
newsletter-article	Articles in publications aimed at researchers, decision-makers, professionals and the public that report on a research project or on the activities of a research chair or a research center.

INTELLECTUAL PROPERTY

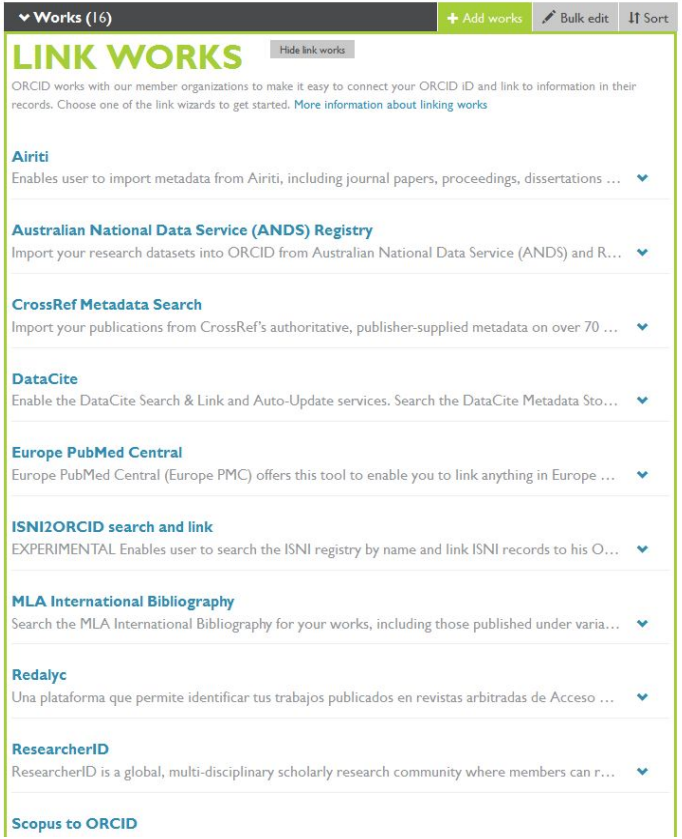
Work Type	Use
disclosure	Publications that establish inventions as prior art thereby preventing others from patenting the same invention or concept.
license	Signed agreements to exploit a piece of IP such as a process, product, data, or software.
patent	A form of IP protection that defines the exclusive right by law for inventors and assignees to make use of and exploit their inventions, products or processes, for a limited period of time.
registered-copyright	Registered ownership of rights under a system of laws for promoting both the creation of and access to artistic, literary, musical, dramatic and other creative works.

OTHER

Work Type	Use
artistic-performance	Collection of information records that, in combination, represent a full and up-to-date history of artistic or performance outputs resulting from, or related to, the person's research or scholarly activities.
data-set	A series of structured observations, measurements or facts identified from the research which can be stored in a database medium.
invention	Practical and original outputs arising from research.
lecture-speech	Practical and original outputs arising from research.
research-technique	A practical methods or skills applied to particular tasks identified as part of the research.
spin-off-company	A company set up by a Research Organization to make commercial use of the results and findings of the Research project.
standards-and-policy	The development of a rule or principle that is used as a basis for judgement.
technical-	Technical Standards (industrial or otherwise) that have originated from the research projects in

Connecting with existing services

- SCOPUS
- CrossRef
- ResearcherID
- Social Media Accounts
- Institutional Affiliations
- Name Disambiguation Services
- Impactstory



Creating an ImpactStory Account:

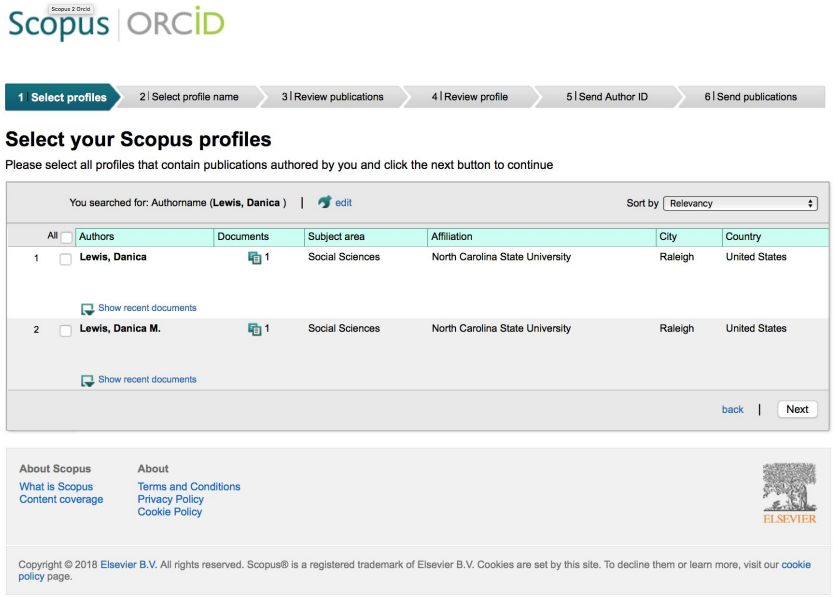
Let's add your publications

Looks like your ORCID doesn't have all your publications associated with it yet. But there's good news—fixing that will take less than five minutes.

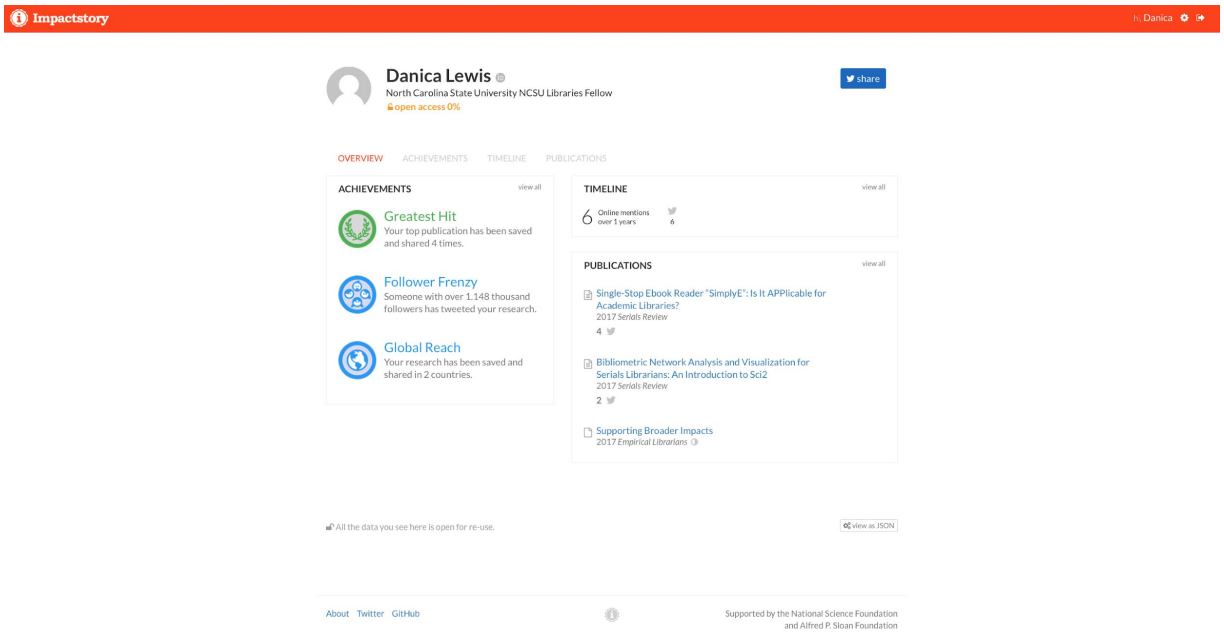
Once you're done, we'll automatically import your publications into Impactstory and you'll be ready to roll.

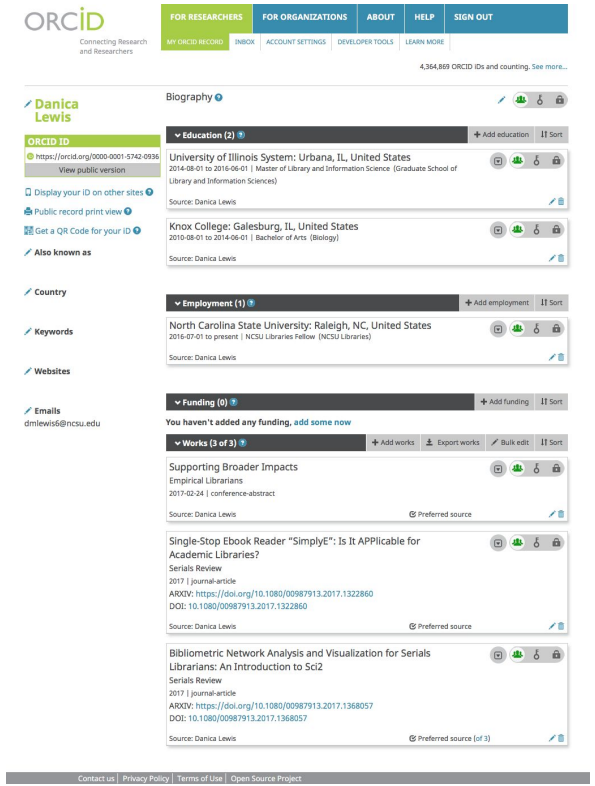
Here's how it works: we'll send you to the Scopus ORCID importer wizard in a new tab. You'll follow the steps in their wizard. When you're done, close that tab and come back here and check out your newly-complete Impactstory profile!

Ok let's do it!



Creating an ImpactStory Account:





Benefits

- Collocate **all** of your research outputs in a single place
- Enhance the visibility of **all** of your research outputs
- Disambiguate yourself from scholars with similar names
- Publishers increasingly integrating with these services
- Funding agencies increasingly integrating with these services (e.g. biosketch services like SciEnCV)

Pitfalls

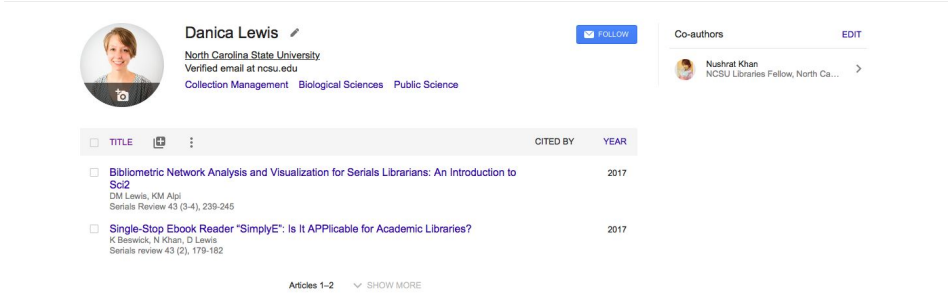
- Yet **ANOTHER** password I have to remember?
- **ANOTHER** account I have to remember to update every time I get another publication out?
- Uneven adoption by publishers and funders

Wait, before you go!
One last option to consider...

Google Scholar Profiles

- Mostly automated service that connects to your existing personal (or work) Gmail address
- Tracks traditional impact metrics and will automatically affiliate papers with you that its algorithms identify as yours based on:
  - Your name
  - Your areas of research
  - Your co-authors
- The more you use it, the better it gets at ID'ing your work

Anyone can do it!



Danica Lewis

North Carolina State University
Verified email at ncsu.edu
Collection Management Biological Sciences Public Science

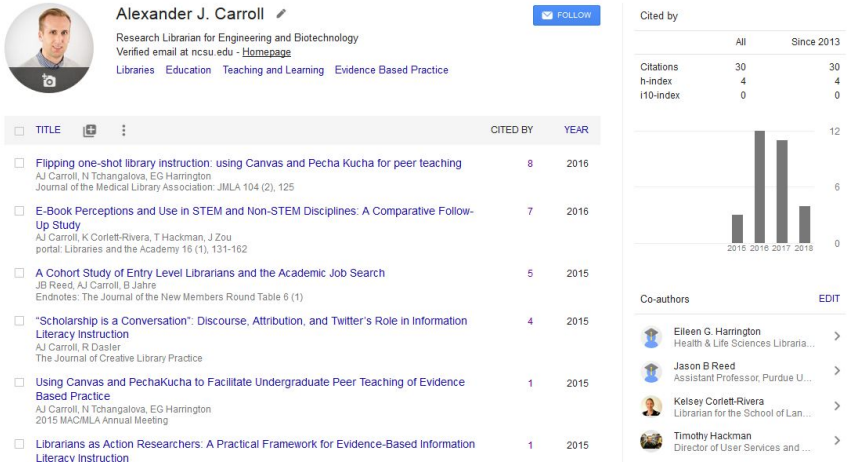
FOLLOW

Co-authors EDIT

Nushrat Khan
NCSU Libraries Fellow, North Ca…

TITLE	CITED BY	YEAR
Bibliometric Network Analysis and Visualization for Serials Librarians: An Introduction to Sci2 DM Lewis, KM Alpi Serials Review 43 (3-4), 239-245		2017
Single-Stop Ebook Reader "SimplyE": Is It APPlicable for Academic Libraries? K Beswick, N Khan, D Lewis Serials review 43 (2), 179-182		2017

Articles 1–2 SHOW MORE



Alexander J. Carroll

Research Librarian for Engineering and Biotechnology
Verified email at ncsu.edu - Homepage
Libraries Education Teaching and Learning Evidence Based Practice

FOLLOW

TITLE	CITED BY	YEAR
Flipping one-shot library instruction: using Canvas and Pecha Kucha for peer teaching AJ Carroll, N Tchangalova, EG Harrington Journal of the Medical Library Association: JMLA 104 (2), 125	8	2016
E-Book Perceptions and Use in STEM and Non-STEM Disciplines: A Comparative Follow-Up Study AJ Carroll, K Corlett-Rivera, T Hackman, J Zou portal: Libraries and the Academy 16 (1), 131-162	7	2016
A Cohort Study of Entry Level Librarians and the Academic Job Search JB Reed, AJ Carroll, B Jahre Endnotes: The Journal of the New Members Round Table 6 (1)	5	2015
"Scholarship is a Conversation": Discourse, Attribution, and Twitter's Role in Information Literacy Instruction AJ Carroll, R Dasler The Journal of Creative Library Practice	4	2015
Using Canvas and PechaKucha to Facilitate Undergraduate Peer Teaching of Evidence Based Practice AJ Carroll, N Tchangalova, EG Harrington 2015 MAC/MLA Annual Meeting	1	2015
Librarians as Action Researchers: A Practical Framework for Evidence-Based Information Literacy Instruction	1	2015

Cited by

	All	Since 2013
Citations	30	30
h-index	4	4
i10-index	0	0

Co-authors EDIT

Eileen G. Harrington
Health & Life Sciences Librarian…

Jason B Reed
Assistant Professor, Purdue U…

Kelsey Corlett-Rivera
Librarian for the School of Lan…

Timothy Hackman
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